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MARTIN COMPANY

DEPARTMENT OF THE AIR FORCE
SPACE SYSTEMS DIVISION
INTERFACE DESIGN REQUIREMENTS DOCUMENT

SIMULATED LABORATORY
TO
RESOLUTION PAINT PATTERN EXPERIMENT

IDRD-MOL-HSQ-63005 .

PROGRAM 624A

CUSTODIAL CONTRACTOR: MARTIN COMPANY

AFFECTED AGENCY: AIR FORCE AVIONICS LABORATORY

26 July 1966

MARTIN COMPANY
AIR FORCE AVIONICS LABORATORY
AEROSPACE CORPORATION
AIR FORCE SPACE SYSTEMS DIVISION
AIR FORCE OFFICE OF AEROSPACE RESEARCH

AVTL Letter of 22 March
1966 (MC Ref. 6W04372)
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IDRD-MOL-HSQ-63005
26 July 1966

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FOREWORD

This document is submitted under Task 5.13 of Exhibit A to Contract AF04(695)-150 in accordance with Line Item 3C-33 of Contractor Specification SSS-TIII-010 DRD (Rev. 3), dated 15 April 1963 and DSCNs 1 thru 147.

This document was approved by CCN 1828 dated 16 August 1966 (Martin Reference 6-W-12743) and by SCD S3-3739 dated 26 July 1966 (Martin Co. Reference 6-W-11104).

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1.0 SCOPE

1.1 General

1.1.1 Purpose - This Interface Design Requirements Document (IDRD) establishes the requirements and restrictions of interfaces between the Martin Company and the Air Force Avionics Laboratory in the integration of the Resolution Paint Pattern experiment into the flight of the MOL-HSQ Program as a secondary payload.

1.1.2 Interface Control - Conformance to the agreements of this IDRD will assure compatibility between the Martin Company design and Air Force Avionics Laboratory requirements. This document shall also serve as a basis for developing and coordinating interface design changes.

1.1.3 Effectivity - This IDRD shall be effective until the conclusion of the MOL-HSQ flight originating at AFETR, Launch Complex 40.

1.2 Responsibilities - The roles and responsibilities of the program participants in the integration of the Resolution Paint Pattern Experiment into the MOL-HSQ Program are as follows:

1.2.1 Air Force Space Systems Division (SSD) - SSD shall provide overall program management.

1.2.2 The Aerospace Corporation - The Aerospace Corporation, with the cognizance of SSD, shall provide general systems engineering and technical direction for the MOL-HSQ Program.

1.2.3 The Martin Company (MC) - The Martin Company shall provide the HSQ Simulated Laboratory, MOL-HSQ supporting AGE, the Resolution Paint Pattern Experiment, and have prime experiment/Laboratory integration responsibility. Martin Company shall also be the custodial contractor for this IDRD.

1.2.4 Air Force Avionics Laboratory - The Air Force Avionics Laboratory shall supply the pattern and paint criteria to the Martin Company for the Resolution Paint Pattern Experiment, and as sponsoring agency for the experiment, provide experiment management functions.

1.2.5 Office of Aerospace Research (OAR) - Detachment 6 OAR provides, through SSD, a management control function over the Martin Company concerning OAR/RTD experiment integration effort, and over OAR/RTD experiments requirements through the individual Air Force sponsoring agencies.

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2.0 APPLICABLE DOCUMENTS

2.1 General - The following documents, of the issue date shown, form a part of this IDRD to the extent specified herein. In the event of conflict between the requirements of this IDRD and any of the referenced documents, the requirements of this IDRD shall govern.

2.2 Range Documents

AFMTCP 80-2

Volume I

Prelaunch Safety Procedures, dated
1 October 1963

Volume II

Operations Requirements, dated
1 June 1962.

3.0 REQUIREMENTS

3.1 General

3.1.1 Definition of Interfaces - The requirements defined herein shall constitute all physical and functional characteristics which affect the design and application of the Resolution Paint Pattern Experiment on the MOL-HSQ Simulated Laboratory.

3.1.2 Payload Description - This experiment consists essentially of three painted strips (alternating black and white) centered 120° apart and running longitudinally down the external surface of the Simulated Laboratory.

3.1.3 Hazard Control - AFMTCP 80-2 shall be complied with for control of the handling and operation of all hazardous materials associated with the MOL-HSQ Simulated Laboratory and the Paint Pattern Experiment.

3.2 System Performance - The Secondary Payloads Mission will be performed by Titan IIIC Vehicle No. 9. The trajectory through the first transtage burn and separation of the Gemini re-entry module shall be as defined by the requirements of the primary mission - the Gemini HSQ test program. The constraints imposed by the HSQ test program result in a semi-ballistic boost trajectory.

3.2.1 Orbital Injection - The nominal injection point requirements at the end of the final Transtage burn are defined as follows:

Inertial Velocity (fps)	25,363
Altitude (n.mi)	160
Eccentricity	0
Orbital Inclination (deg)	32.86

3.2.2 Vehicle Angular Rates

3.2.2.1 Long Coast Mode - After completion of the satellite dispensing sequence angular rates of the vehicle during the stabilized flight interval shall not exceed the following values:

Pitch Rate	To be supplied
Yaw Rate	To be supplied
Roll Rate	To be supplied

3.2.2.1 (Cont'd)

During this stabilized portion of flight, the vehicle roll axis is parallel to the local horizontal and the vehicle roll and yaw axes shall be in the orbital plane. Allowable vehicle attitude errors in pitch, yaw, and roll, excluding IGS error build-up shall be as follows:

Pitch	3.5 degrees
Yaw	3.5 degrees
Roll	2.0 degrees

After a total elapsed time of approximately 7 hours from lift-off the vehicle attitude control system will impart rates to the vehicle and then the transtage ACS system will be disabled as defined in Paragraph 3.2.2.2.

3.2.2.2 Tumbling Flight - Pitch, roll and yaw rates will be imposed on the Laboratory at end of the stabilized portion or orbit. In an attempt to control internal Laboratory Temperatures, attitude rates will be nominally commanded as follows:

	Rate (deg./sec.)
Pitch	0.10
Roll	0.30
Yaw	0.00

Torque producing devices within the Transtage, however, will remain in operation and there is no guarantee on the values of pitch, yaw and roll rates following the end of stabilized orbit.

3.2.3 Orbital Lifetime - The estimated orbital lifetime of the vehicle is 75 days + _____, excluding the effects on orbital velocity resulting from operation of the ACS system and dispensing of the Secondary Payload satellites.

3.3 Experiment Application Requirements - Application of the paint pattern shall be in accordance with Figure 1.

3.3.1 Paint Characteristics

3.3.1.1 - Martin Company shall utilize the following paints in the application of the paint pattern to the Simulated Laboratory.

White Paint

Martin Finish 603 MMSK227-A.
Commercial Vendor No: Sherman-Williams
490 South Federal Blvd. - Denver, Colo.
(M49WC-8)

3.3.1.1 (Cont'd)

Black Paint

Martin Finish 604 MMSK227-B
Commercial Vendor No: Sherman-Williams
490 South Federal Blvd. - Denver, Colo.
(M49BC-9)

Aluminum

Martin Finish 715 MMSK453 Type 1.
Commercial Vendor No: Midland
Industrial Finishes Co., East Water St.,
Waukegan, Ill. (Type 3X258).

3.4 Airborne Power Requirements - N/A

3.5 Ground Power Requirements - N/A

3.6 RF Systems - N/A

3.7 Measurements - N/A

3.8 Measurements-HSQ Transmitted - N/A

3.9 Wiring - N/A

3.10 Data Reduction - N/A

3.11 Checkout Requirements - N/A

3.12 Hoisting and Handling - N/A

3.13 Ground Checkout Power - 120 volt (nominal) receptacles for power to the experiment checkout equipment shall be provided as follows:

3.13.1 Three receptacles (one on each level) inside the laboratory vehicle. The maximum power available at any given time will be 20 amps per receptacle (the circuit limit is 30 amps total for the three receptacles). Receptacles are Crouse-Hinds #FSQ-2320-GB and require a Crouse-Hinds #APJ-3363 or #APJ-3365 mating plug.

3.13.2 Receptacles on the Mobile Service Tower as shown on Figure 2. The maximum power available shall be 20 amps per receptacle. These receptacles are Crouse-Hinds #FSQ-2320-GB and require the same mating plug as in Paragraph 3.13.1 above.

3.13.3 Four grounding in type duplex receptacles similar to Hubbell #5262 located within 30 feet of the center line of the vehicle at levels 9, 10, and 11 at the Vertical Integration Building. The maximum power available shall be 10 amps per receptacle.

All of the above receptacles must be shared on a time basis with all experimenters. The interface between Martin and the experimenter will be at the receptacle. The cable and the plug to mate with the receptacle shall be furnished by the experimenter.

- 3.14 Vehicle Orientation - N/A
- 3.15 Satellite Dispensing - N/A
- 3.16 Environment - N/A
- 3.17 Dynamic Constraints - N/A
- 3.18 Forces Due to Satellite Dispensing - N/A
- 3.19 Physical Access Requirements - N/A
- 3.20 Ordnance - N/A
- 3.21 EMC - N/A

4.0 INTERFACE COMPATIBILITY TEST REQUIREMENTS

4.1 General - The test requirements herein are those tests required to verify the Simulated Laboratory to Resolution Paint Pattern Experiment interface compatibility.

4.2 None

5.0 COMMENTARY

5.1 Abbreviations

AVTL	Air Force Avionics Laboratory
MC	Martin Company
SSLV	Standard Space Launch Vehicle

5.2 Definitions

Orbiting Vehicle - The Orbiting Vehicle shall consist of the Transtage, Simulated Laboratory, and Gemini Conical Adapter.

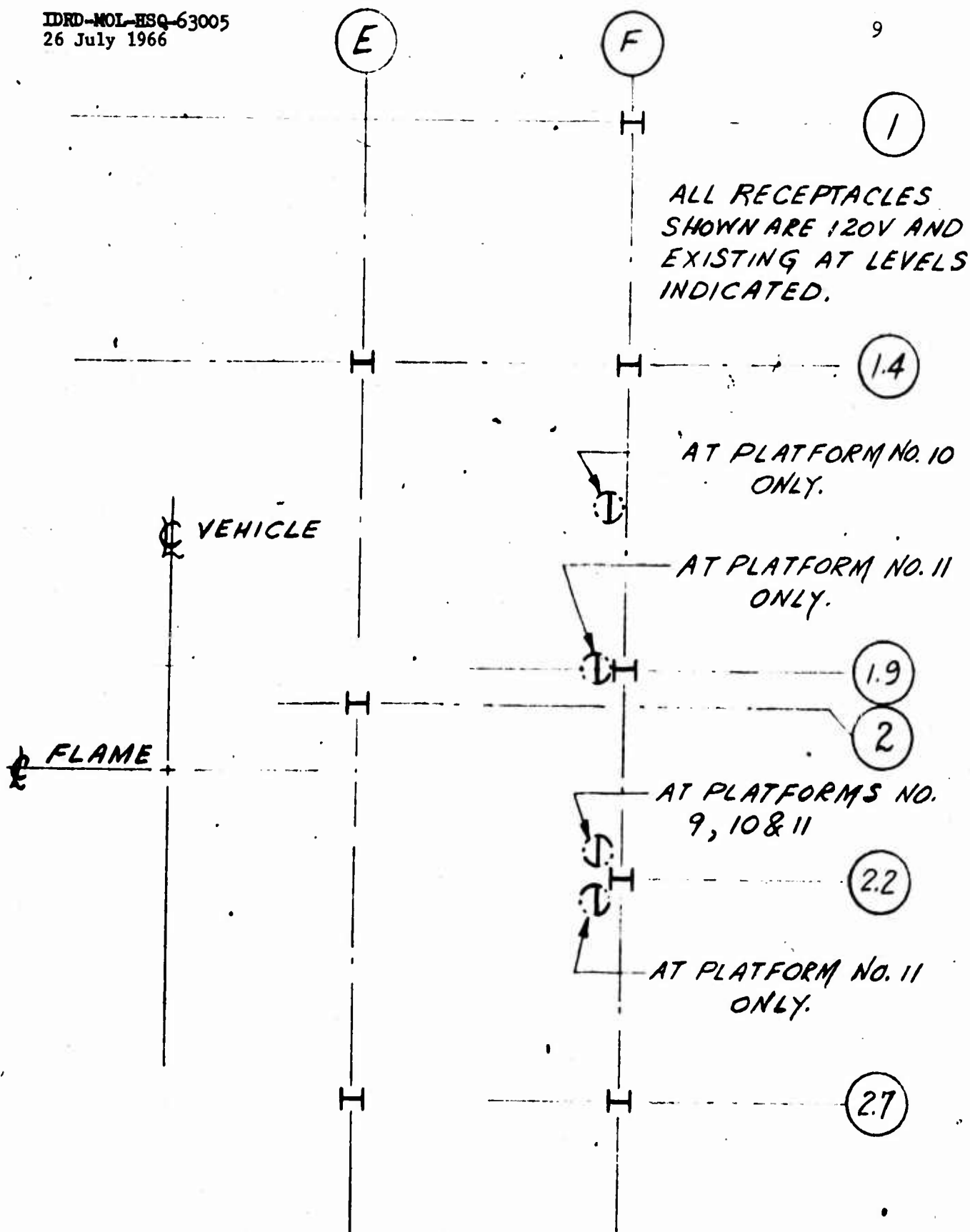
Transtage - The Transtage is the third stage of the Titan III SSLV.



- (A) WHITE PAINT FINISH 603 MMSK227-A ▽
 (B) BLACK PAINT FINISH 604 MMSK227-B ▽
 (C) IRIDITE FINISH 198
 (D) ALUMINUM PAINT FINISH 715 MMSK 453 TYPE-1 ▽
 [] ANTENNA COVER - SAME AS (A) FINISH
 [] STRUCTURAL PANEL

For Commercial Vendor Numbers - See Para. 3.3.1

FIGURE 1: MOL HSQ EXTERIOR FINISH



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COMPOSITE PARTIAL PLAN

PLATFORMS NO. 9, 10 & 11

MOBILE SERVICE TOWER. SCALE 1/8" = 1'-0"

FIGURE 2